

4.2 Sweet Resources

Model of Natural Resource Limitations

Overview Students will use an interactive model to investigate how natural resource depletion and waste increase with technological advances and population growth.

Lesson Planner Use the table below for lesson planning purposes.

Time Required	45 – 60 minutes
Key Concepts/Terms	Natural Resources (Renewable and Non-renewable), Technology, Conservation, Waste
Prerequisites	None
Setting	Indoors/Outdoors, Whole Class

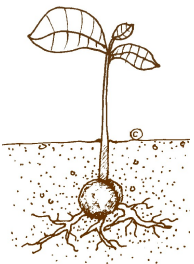
Learning Objectives After completing this activity, students will be able to...

- Understand our connection to the environment and our dependence on Earth's natural resources;
- Identify renewable and non-renewable natural resources and their importance to society; and
- Compare and contrast agricultural changes and technological advancements over time.

Materials Required The following materials are required to complete this activity...

- 2 pounds of M&M™ candies (or mixed beans)
- 6-7 flimsy paper plates
- napkins for each student

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4.2 Sweet Resources, Continued

Background Information

A **Natural Resource** is a portion of the environment upon which people have placed or assigned value. Natural resources fall into two categories: **renewable** and **non-renewable**.

Why are natural resources in jeopardy?

Earth's non-renewable natural resources are finite, and many renewable resources are being used/depleted faster than they can be naturally replaced. Population growth and technological advances allow people to extract/harvest natural resources at a tremendous rate, often resulting in great waste.

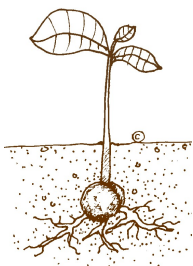
Procedure

This activity is a simulation that will be conducted in three rounds, as outlined in the table below.

Round	Time Period	Common Tools in Use During This Period	Number of Volunteers Needed	M&M's™ are Collected Using...
1	Prehistoric	Spears, Clubs, Digging Stones	2	Index finger and Thumb of ONE hand
2	Colonial	Hand Shovels, Horse-drawn Plows, Dynamite	3	First 3 fingers & Thumb of ONE hand
3	Present Day	Bulldozers, Cars, Drills, Tractors	5-6	ONE entire hand

Follow the steps in the table below to conduct the activity. **Sentences in bold are suggestions for what teachers might say to students.** *Items in italics are possible student answers to questions.*

Phase	Step	Action
Engage	1	Have students form two concentric rings around a paper plate set on the floor. The inner ring of students can sit/kneel, which will allow the outer ring of students to view the activity as well.
	2	Ask students to define NATURAL RESOURCES .
	3	Have students brainstorm and identify RENEWABLE (ex: fish, wildlife, forests) and NON-RENEWABLE NATURAL RESOURCES (coal, oil, minerals, etc.).



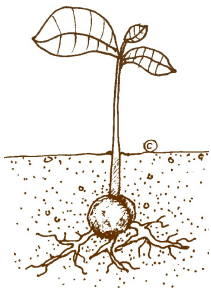
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4.2 Sweet Resources, Continued

Procedure (continued)

Phase	Step	Action
Engage	4	Explain that the paper plate in the center of the circle is a model representing the Earth.
	5	Pour 1 pound of candies/beans onto the plate, and explain that they represent all of the earth's non-renewable natural resources. (The plate should be heaped full, almost overflowing.)
	6	Have students assign each color to represent a different non-renewable resource (ex. green = oil, brown = coal, etc.).
	7	Explain that the students will represent all the people on earth at different times in history.
Explore	8	Ask for the appropriate number of volunteers, as outlined on the preceding table.
	9	Discuss the tools of each time period with students.
	10	Explain what parts of the hand may be used to collect candies/beans during this round. This changes with each round to represent technological advances through time.
	11	Allow students to collect "resources" while you count for 3 seconds.
	12	Have students place the "resources" they collected on their napkin in front of them and return to their original positions. Note: Remind students not to eat any of the "resources" until the end of the activity.

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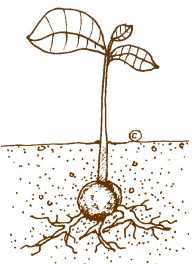


4.2 Sweet Resources, Continued

Procedure (continued)

Phase	Step	Action
Explore	13	Have students estimate the amount of waste they see, and compare it to the amount of resources that the volunteers obtained, as well as the amount remaining. Remind students that any “resources” that fell on the ground are waste and may not be collected or used.
	14	Compare the results of this round with any previous rounds.
Explain	15	Lead the class in a discussion of the following questions: <ul style="list-style-type: none"> • What’s left of the Earth’s resources (candies/beans)? How will this affect the lives of future generations? • What do you think about all of the waste? • Considering our soil, what effect will severe loss/degradation have on our food supply? Will this affect the cost of food? • What would the earth look like if we continue to use our non-renewable resources at this rate? • What can we do to prevent resource depletion and conserve our remaining resources? (4 R’s: rethink, reduce, reuse, recycle) • What about the students left in your group that didn’t get any candy/beans? Is this fair? How does this resemble the use of resources on earth? Resources on the Earth are not distributed equally. Many countries do not have the access to natural resources that we in industrialized nations enjoy. This activity brings that point home for students, as not everyone in the class gets equal “resources.”
Elaborate	16	Have students research or discuss the function of various natural resources (renewable and non-renewable) in our economy. Examples could include: building on soil; burying garbage in soil; building with soil; etc.

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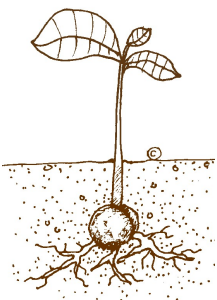


4.2 Sweet Resources, Continued

Procedure (continued)

Phase	Step	Action
Elaborate	17	<p>Adapt the activity to represent renewable resources. With this version, start with $\frac{1}{2}$ pound of M&M's, because whatever resource you choose will need to renew, so you need to save some of the original pound to account for this.</p> <p>An example for a variation could be the use of fishing and fishing harvests.</p> <ul style="list-style-type: none"> • Fishing tools have changed over time, increasing our fish harvest. • In the case of this example, the teacher needs to "allow" the fish to reproduce annually. • The teacher will note the size of the population after a round, and AT MOST double the population for reproduction. • The total population of any round should not exceed the $\frac{1}{2}$ pound used at the start of the activity.
Evaluate	18	<p>Student understanding should be informally assessed throughout the discussion portions of the activity.</p>

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4.2 Sweet Resources, Continued

Vocabulary

Understanding of the following terms is useful in this activity.

Term	Definition
Conservation	Using natural resources in ways that assure their continuing availability to future generations; the wise and intelligent use or protection of natural resources
Non-renewable Resources	Resources that exist in limited quantities and can't be replenished by natural processes within the foreseeable future, including minerals and fossil fuels
Renewable Resources	Resources that can be grown again or exist in an unlimited supply. <i>(Examples: trees, fish, crops, wind energy, solar energy)</i>
Resource	Something that people value and use.
Technology	The tools, machines, and methods used to accomplish tasks.

